GL Sciences

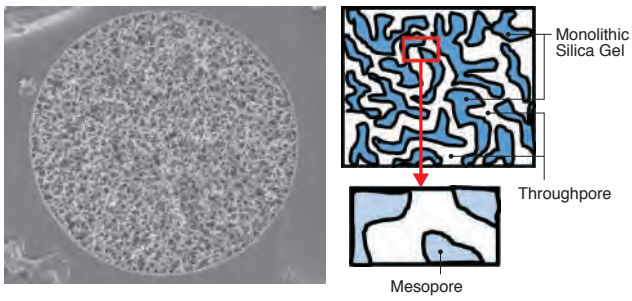
Monolithic HPLC Columns

MonoCap High Resolution Columns

Monolithic silica capillary HPLC column which is designed for identifying extremely high number of peptides/proteins for proteome research via LC-MS/MS.

Monolithic Capillary HPLC Columns

MonoCap Series



Structure of Monolithic Silica

GL Sciences' MonoCap series, created synthetically via sol-gel method, and an octadecyl silane chemically bonded, has a very uniform three dimensional structure that shows excellent reproducibility from batch-to-batch. The solid structure of GL Sciences' monolithic silica eliminates the need for frits or filters at the ends of the column, thereby reducing dead volume that might otherwise lead to band broadening or sample recovery. The high porosity of our monolithic silica allows high flow rates to be used without loss of resolutionor creation of high operating pressure. An optimized balance of throughpores and mesopores provides the critically importantcombination of efficiency, separation speed, large volume sample-loading, and small volume sample-recovery.

MonoCap High Resolution provide extremely high efficiency, delivering over 200,000 plates for a 2,000 mm length column. The High Resolution Ultra type deliver over 300,000 plates. The Fast-flow type is compatible with high flow rate analysis due to its' low flow resistance. In addition, the equilibration time can be minimized further by setting the flow rate high.
MonoCap Nano-flow is a high-density monolithic capillary column offering extremely high sensitivity in LC/MS due to the optimization of mesopore and throughpore sizes. MonoCap Trap columns have a relatively big throughpore, which are available for on-line preconcentration or desalting of protein and peptide samples prior to HPLC separation with mass spectrometry detection.

Physical Properties of MonoCap Series

Description	Monolithic Silica	Skeleton	Throughpore	Mesopore	Porosity	Bonded Phase	End-capping	Max. Operating Pressure
MonoCap C18 High Resolution 750	High Purity Silica Gel	1 µm	2 µm	15 nm	85 %	Octadecyl Groups	Yes	22 MPa
MonoCap C18 High Resolution 2000		1 µm	2 µm	15 nm	85 %	Octadecyl Groups	Yes	35 MPa
MonoCap C18 High Resolution Ultra 2000		1 µm	2 µm	11 nm	85 %	Octadecyl Groups	Yes	35 MPa
MonoCap C18 Fast-flow		1 µm	2 µm	15 nm	85 %	Octadecyl Groups	Yes	22 MPa
MonoCap C18 Nano-flow		1 µm	1 µm	11 nm	85 %	Octadecyl Groups	Yes	22 MPa
MonoCap C18 WideBore		1 µm	2 µm	11 nm	85 %	Octadecyl Groups	Yes	22 MPa
MonoCap C18 Trap Column		2 µm	5 µm	11 nm	85 %	Octadecyl Groups	Yes	20 MPa
MonoCap Amide		1 µm	2 µm	15 nm	85 %	Carbamoyl Groups	None	22 MPa
MonoCap SCX		2 µm	5 µm	11 nm	85 %	Benzenesulfonyl Groups	None	20 MPa
MonoCap HILIC-UP High Resolution 2000		1 µm	2 µm	12 nm	85 %	Ureidopropyl Groups	None	35 MPa

* Based on monolithic technology, Merck KGaA, Darmstadt, Germany.

End-fittings of MonoCap Monolithic Capillary HPLC Columns

MonoCap C18 High Resolution 750
MonoCap C18 fast-flow
MonoCap Nano-flow
MonoCap C18 WideBore
MonoCap Amide
MonoCap SCX

1. Metal Hardwares
   End-fittings are Valco 1/16" (10-32 UNF).
   Valco 1/32" (6-40 UNF) end-fittings can also be arranged upon request, indicate "1/32" when ordering.

2. PEEK Hardwares
   1/16" male nut, ferrule and PTFE sleeve are included.

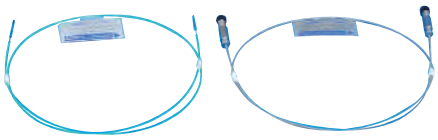
MonoCap C18 High Resolution 2000
MonoCap C18 High Resolution Ultra 2000
MonoCap HILIC-UP High Resolution 2000

End-fittings are not included.
The connection kits must be purchased separately.

Monolithic Capillary HPLC Columns

MonoCap™ C18 High Resolution/MonoCap™ C18 High Resolution Ultra

MonoCap High Resolution 2000

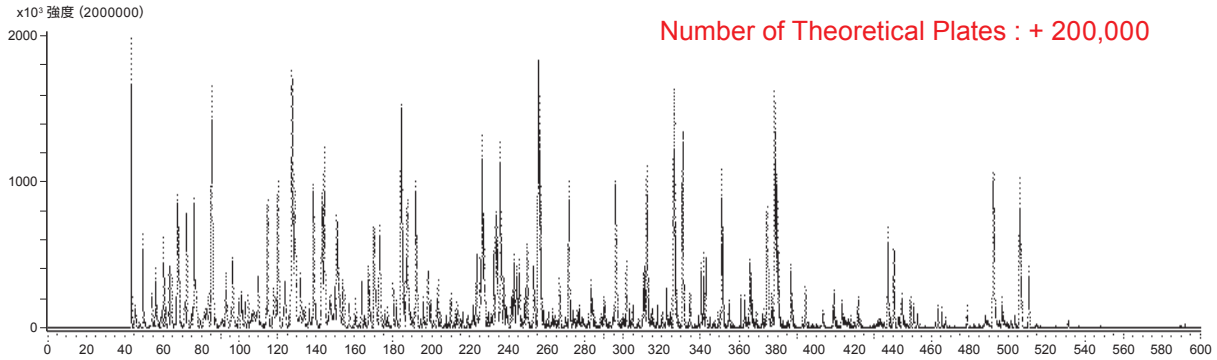


PEEK Metal

MonoCap High Resolution 750

Maximizing all the benefits and advantages of monolithic technology, MonoCap High Resolution and High Resolution Ultra are appropriate for the efficient separation of peptides and protein digests.
MonoCap High Resolution 750 deliver over 60,000 plates, while 2000 deliver over 200,000 plates.
The newly-introduced High Resolution Ultra type deliver over 300,000 plates.

Figure 1 : Analysis of Tryptic Digests



Number of Theoretical Plates : + 200,000

Conditions

Column : MonoCap C18 High Resolution 2000 (2000 mm × 0.1 mm I.D)
Trap column : MonoCap C18 Trap Column (50 mm × 0.075 mm I.D.)
Eluent : A) 0.1 % HCOOH in CH_3CN
B) 0.1 % HCOOH in H_2O
A/B = 10/90 - 600 min - 45/55, v/v

Flow Rate : 0.5 µL/min
Injection Vol : 5 µL
Detection : MS (TIC m/z 500 - 1500)
Sample : Tryptic digest of proteins

MonoCap™ C18 High Resolution Ultra 2000

I.D.(mm)	Length(mm)	Cat.No.
0.1	2000	IN5020-10018

MonoCap™ C18 High Resolution 2000

I.D.(mm)	Length(mm)	Cat.No.
0.1	2000	IN5020-10015

MonoCap™ HILIC-UP High Resolution 2000

I.D.(mm)	Length(mm)	Cat.No.
0.1	2000	IN5020-10019

* A column stand is included.
End-fittings are not included.

MonoCap HILIC-UP is an important addition to the MonoCap C18 High Resolution 2000 column series. MonoCap HILIC-UP can retain highly hydrophilic peptides/proteins which may lead to discovering new peptides/proteins where a C18 phase couldn't identify.
In HILIC, the higher the organic concentration, the greater the retention of more polar analytes. One of the biggest benefit of HILIC mode is, a high organic solvent concentration of the mobile phase will lead to a high sensitivity LC-MS/MS analysis.

Reference:
Hydrophilic Interaction Chromatography Using a Meter-Scale Monolithic silica capillary Column for Proteomics LC-MS,
K Horie et al. Anal. Chem. 2014, 86, 3817-3824

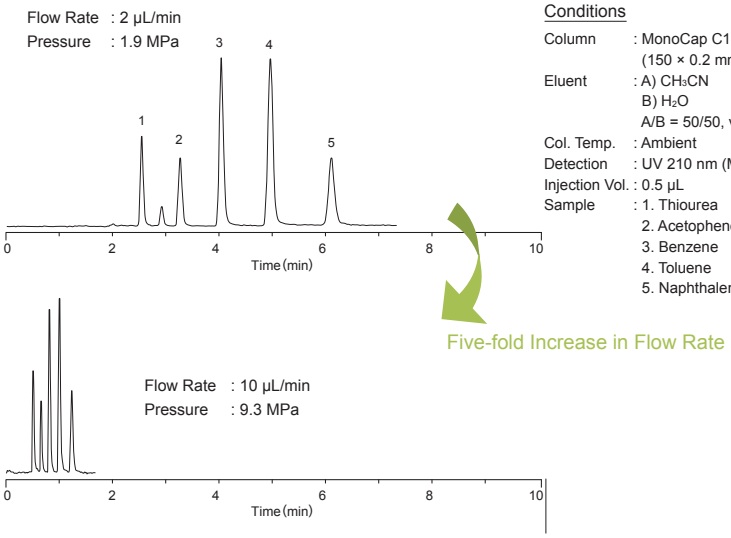
MonoCap™ C18 High Resolution 750

I.D.(mm)	Length(mm)	Material of Hardware	Cat.No.
0.2	750	Metal	IN5020-10123
		PEEK	IN5020-10023

Monolithic Capillary HPLC Columns

MonoCap™ C18 Fast-flow

Figure 1 : Workable at High Flow Rates without Sacrificing Efficiency



Conditions

Column : MonoCap C18 for Fast-flow (150 × 0.2 mm I.D.)
Eluent : A) CH_3CN
B) H_2O
A/B = 50/50, v/v
Col. Temp. : Ambient
Detection : UV 210 nm (MU701, Cell Volume 18 nL)
Injection Vol. : 0.5 µL
Sample : 1. Thiourea
2. Acetophenone
3. Benzene
4. Toluene
5. Naphthalene

Workable at a broad range of linear velocity from 0.5 to 5 mm/s without sacrificing efficiency and separation at high speed. The number of theoretical plates produced by MonoCap C18 Fast-flow is nearly equivalent to a totally porous particle type capillary column packed with a 5 µm packing material. Columns are protected by either metal or PEEK hardwares.

PEEK

Metal

I.D.(mm)	Length(mm) / Material of Hardware	50 Cat.No.	150 Cat.No.	250 Cat.No.
0.05	Metal	IN5020-10102	IN5020-10101	IN5020-10100
	PEEK*	IN5020-10002	IN5020-10001	IN5020-10000
0.075	Metal	IN5020-10211	IN5020-10212	IN5020-10213
	PEEK*	IN5020-10221	IN5020-10222	IN5020-10223
0.1	Metal	IN5020-10112	IN5020-10111	IN5020-10110
	PEEK*	IN5020-10012	IN5020-10011	IN5020-10010
0.2	Metal	IN5020-10122	IN5020-10121	IN5020-10120
	PEEK*	IN5020-10022	IN5020-10021	IN5020-10020

* All 50 mm length PEEK columns does not come with a hardware and will be supplied with 3 pcs of columns only.

MonoCap™ C18 Nano-flow

MonoCap C18 Nano-flow produces higher number of theoretical plates compared to a totally porous particle type capillary column packed with a 3 µm packing material. It can be operated at a wide range of flow rate with low back pressure and achieve very high sensitive results in Nano-LC-ESI/MS applictions. Columns are protected by either metal or PEEK hardwares.

I.D.(mm)	Length(mm) / Material of Hardware	50 Cat.No.	150 Cat.No.
0.05	Metal	IN5020-1014 3	IN5020-10141
	PEEK*	IN5020-1004 3	IN5020-10041
0.075	Metal	IN5020-10231	IN5020-10232
	PEEK*	IN5020-1024 1	IN5020-10242
0.1	Metal	IN5020-10153	IN5020-10151
	PEEK*	IN5020-10053	IN5020-10051
0.2	Metal	IN5020-1016 3	IN5020-10161
	PEEK*	IN5020-1006 3	IN5020-10061

* All 50 mm length PEEK columns does not come with a hardware and will be supplied with 3 pcs of columns only.

Monolithic Capillary HPLC Columns

MonoCap™ C18 WideBore

The MonoCap C18 Fast-flow is also available in 0.5 mm I.D. size, which can be used at a wide range of flow rate from 6 to 100 µL/min without sacrificing efficiency. The number of theoretical plates produced by MonoCap C18 WideBore is nearly equivalent to a totally porous particle type capillary column packed with a 5 µm packing material. Columns are protected by metal hardwares.

I.D.(mm)	Length(mm) Material of Hardware	50 Cat.No.	150 Cat.No.	250 Cat.No.
0.5	Metal	IN5020-10202	IN5020-10201	IN5020-10200

MonoCap™ C18 Trap Column

MonoCap C18 Trap Column with Hardware
(Top Image: 1/16" End-fittings, Bottom Image: 1/32" End-fittings)

MonoCap Trap columns have a relatively big throughpore and workable at a high flow rate such as 10 µL/min. This benefit makes MonoCap Trap columns to be appropriate for on-line preconcentration or desalting of protein and peptide samples prior to HPLC separation with mass spectrometry detection.
End-fittings are 1/16" (10-32 UNF). 1/32" end-fittings are also available upon request.

I.D.(mm)	Length(mm) Hardware	50 Cat.No.	100 Cat.No.	150 Cat.No.
0.05	With Hardware	IN5020-10026	IN5020-10038	-
	Without Hardware	IN5020-10027	IN5020-10039	
0.075	With Hardware	IN5020-10028	IN5020-10036	
	Without Hardware	IN5020-10029	IN5020-10037	
0.2	With Hardware	IN5020-10033	-	
	Without Hardware	IN5020-10034		IN5020-10031

MonoCap™ Amide

Amide groups are chemically bonded to the monolithic silica and makes it suitable for the analysis of sugars via HILIC mode. As the back pressure is significantly low, a 500 mm length MonoCap Amide column deliver over 40,000 plates offering high efficiency. Generally, HILIC mode uses acetonitrile at a concentration between 65-95 % in an aqueous buffer such as ammonium acetate or ammonium formate, which have high solubility in organic solvents. Columns are protected by either metal or PEEK hardwares.

I.D.(mm)	Length(mm) Hardware	150 Cat.No.	250 Cat.No.	500 Cat.No.
0.075	Metal	IN5020-10191	IN5020-10192	IN5020-10193
	PEEK	IN5020-10091	IN5020-10092	IN5020-10093
0.1	Metal	IN5020-10181	IN5020-10182	IN5020-10183
	PEEK	IN5020-10081	IN5020-10082	IN5020-10083
0.2	Metal	IN5020-10171	IN5020-10172	IN5020-10173
	PEEK	IN5020-10071	IN5020-10072	IN5020-10073

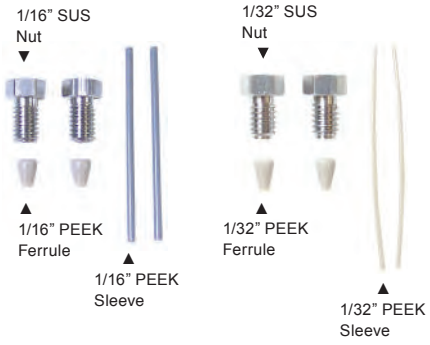
MonoCap™ SCX

MonoCap SCX is bonded with benzene sulfonic acid groups (strong cation exchange) and appropriate for 2D LC applications for the separation of biomolecules such as peptides and proteins.

I.D.(mm)	Length(mm) Material of Hardware	50 Cat.No.	150 Cat.No.	250 Cat.No.	500 Cat.No.
0.2	Metal	IN5020-10174	IN5020-10175	IN5020-10176	IN5020-10177
	PEEK	IN5020-10074	IN5020-10075	IN5020-10076	IN5020-10077

Consumables and Accessories for Monolithic Capillary HPLC Columns

Connection Kit for MonoCap™ C18 High Resolution



Connection Kit for MonoCap™ C18 High Resolution 2000

A dedicated connection kit for MonoCap C18 High Resolution 2000.
Use this connection kit when connecting the column directly to the system.

Description	Contents of Kit	Cat.No.
Connection Kit for MonoCap C18 High Resolution 2000	1/16" PEEK Ferrule, SUS Nut, Sleeve 2 pcs each 1/32" PEEK Ferrule, SUS Nut, Sleeve 2 pcs each	IN5020-10017

Zero Dead Volume Union

Connect the tubing from the system to this union and install the column to achieve zero dead volume.

Description	P/N	Orifice	Remarks	Cat.No.
Zero Dead Volume Union	U-435	0.25 mm	1/16"Tubing SUS Male Nut, Ferrule 2 pcs each	IN6010-72352
	U-411	178 µm		IN6010-72351

Connection Kit for MonoCap™ C18 Trap Column

MonoCap C18 Trap Column Connection Kit 1/16"

Description	Cat.No.
MonoCap C18 Trap Column Connection Kit 1/16" (Union·Sleeve·Capillary Tubing 2 pcs each Nut·Ferrule4 pcs each)	IN5020-10044
MonoCap C18 Trap Column Connection Kit 1/32" (Union·Sleeve·Capillary Tubing 2 pcs each Nut·Ferrule4 pcs each)	IN5020-10045
MonoCap C18 Trap Column Assembly Parts 1/16" (Nut·Ferrule4 pcs each)	IN5020-10046
MonoCap C18 Trap Column Assembly Parts 1/32" (Nut·Ferrule4 pcs each)	IN5020-10047